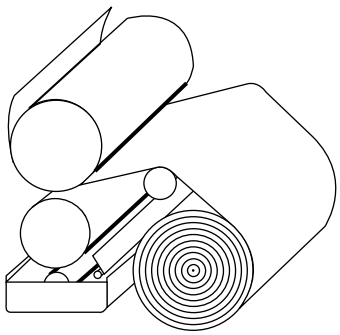
FACT SHEET

Department of Toxic Substances Control
Alternative Technology Division
May 1992

Waste Minimization for the Commercial Printing Industry



Introduction

The commercial printing industry generates hazardous waste as a result of its operations. The Department of Toxic Substances Control (DTSC) regulates the generation, treatment, storage, transport, and disposal of hazardous wastes throughout the State. The DTSC is committed to minimizing hazardous wastes generated to the greatest extent possible. As part of this effort, studies investigating alternative management strategies to minimize hazardous waste have been completed. This fact sheet introduces the hazardous waste audit study conducted specifically for the **commercial printing industry.** Many companies today have incorporated these options into their overall operations and are **saving money** on hazardous waste management costs while protecting their workers and the environment.

Wastestreams Typical of the Commercial Printing Industry:

- Waste photochemical solutions and films: for example, some of these are classified as hazardous products and may also be hazardous as wastes under State regulations.
- Waste inks containing hazardous components (often metallic pigments and solvents)
- Ink-contaminated solvents and rags used for cleaning
- Lubricating oils from machinery

WASTE MINIMIZATION INCENTIVES

Hazardous waste minimization can be an effective, economic way to minimize hazardous waste management costs. In some instances, it may require some initial capital investment but many companies have shown that, even in the short term, they can quickly recover these “up-front costs” when hazardous waste management and liability costs are minimized. Other advantages include:

- Reduced tax burden from generator fees, land disposal fees, and taxes
- A safer workplace for employees
- Reduced compliance requirements
- Reduced threat to the environment
- Improved corporate image in the community

This Fact Sheet was produced by the Waste Minimization Branch to assist generators throughout the State of California

WASTE MINIMIZATION

State and Federal laws require hazardous waste generators to consider available waste minimization techniques before using other waste management methods. All generators must certify on their manifests that they have a waste minimization program in place and they must submit a Biennial Generator Report. In California, generators must include descriptions of the changes in hazardous waste volume and toxicity accomplished through waste minimization during the two years between reporting periods (Health and Safety Code 25244.4).

In addition, State and Federal land disposal restrictions and treatment standards provide direct incentives for minimizing hazardous waste. These regulations prohibit the land disposal of certain hazardous wastes altogether and have restricted the land disposal of other hazardous wastes. Only hazardous wastes meeting specified treatment standards can go to land disposal (Health and Safety Code, Article 7.7).

Waste Minimization Definitions

Waste minimization methods are divided into the following waste management hierarchy: 1) source reduction and 2) recycling (onsite and offsite).

Source Reduction

Source reduction is any activity that prevents or reduces the generation of hazardous waste. It does not mean reducing the volume or toxicity of an already-generated waste.

The Hazardous Waste Source Reduction and Management Review Act of 1989 (SB14) requires generators that generate more than 12,000 kilograms (13.2 tons) per year of hazardous waste or 12 kilograms (26.4 pounds) per year of extremely hazardous waste to take a serious look at source reduction as the preferred method of managing waste. Under this Act, on or before September 1, 1991, and every four years thereafter, generators are required to prepare a "source reduction evaluation review and plan" which identifies all major hazardous waste streams at the generator's site. For each identified waste stream, the generator must evaluate any and all potentially viable source reduction approaches.

In addition to the evaluation review and plan, generators are also required to prepare a "hazardous waste management performance report" which assesses the effectiveness of hazardous waste management procedures previously implemented by the generator, including recycling and treatment activities.

Recycling

The use, reuse, or reclamation of hazardous constituents is recycling. Recycling is second in the waste management hierarchy because the hazardous waste is generated, thus representing some hazard to the environment if mismanaged.

> Use - to directly use a hazardous waste in a different process. It does not require that the hazardous waste be processed before use.
>
> Reuse - to directly reuse a hazardous waste in the same process ("in-process recycling"). Reuse also does not require processing.
>
> Reclamation - to recover or regenerate a component for reuse. It can be done onsite without a permit as long as something is being recycled. Many of these processes are actually treatment processes with the major difference being that the reclaimant is reused in the process. Reclamation that is done offsite usually requires a permit, especially if it is commercial recycling.

Recycling and other waste minimization techniques always involve some risk of failure. When recycling fails, the waste most often has to be disposed as hazardous waste.

WASTE MINIMIZATION ALTERNATIVES

Management Commitment

An important aspect of any waste minimization program is **management commitment.** Commitment shows employees that managers place a high priority on waste minimization. For example, a conspicuously posted shop policy signed by top management, requiring waste minimization, will aid in making it a critical part of all day-to-day activities. All employees must be encouraged to participate in minimizing wastes to the greatest extent possible.

Also, if an employee is placed in charge of identifying ways to minimize wastes, he or she must be given the cooperation, by both employees and management, necessary to implement changes in shop operations.

Employee Awareness

- Hazardous waste minimization efforts should be emphasized to each employee, from the general manager to machinery operators.
- Employee suggestions should be encouraged through a merit program or some other type of incentive.

Good Housekeeping

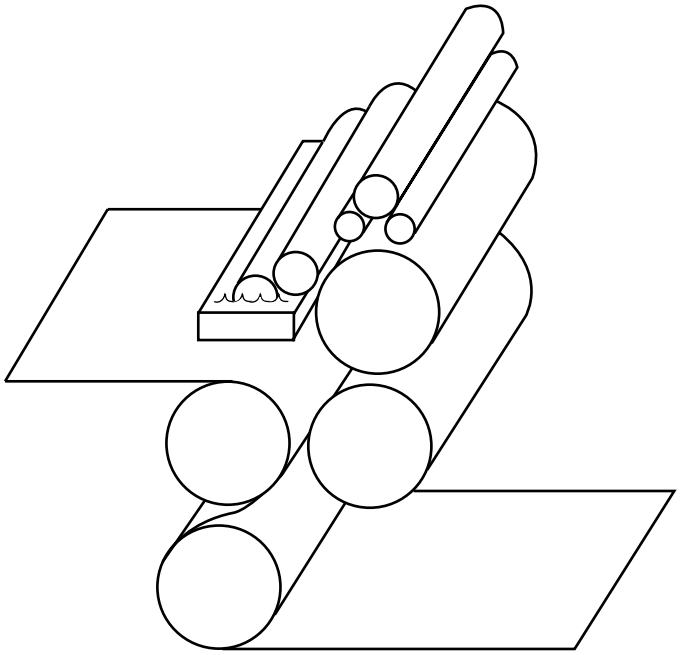
- Segregate wastes to increase recyclability.
- Keep careful records of inventory control. Implement a 'first-in, first-out' policy of chemical product use. Do not order more than can be used within the shelf life of the product. Labels and expiration dates should be legible.
- Designate one person, usually the shipping and receiving clerk, to manage raw materials for proper inventory control and to ensure that hazardous substances are properly contained and labeled and that a Material Safety Data Sheet (MSDS) is on file.
- If materials have exceeded their shelf life, check on alternative uses before discarding. Consider contacting nearby theater groups or college graphic arts departments to donate expired materials for their programs. Also, buy only from a manufacturer that will accept materials back if shelf life is exceeded.
- Minimize spills and use dry methods for cleanup wherever possible. If a spill of a hazardous substance occurs, use an absorptive material to soak it up and dispose of it in accordance with all Local, State, and Federal regulations.
- Monitor press performance continuously to minimize bad runs and waste. There are commercially available detectors and other equipment for this purpose.
- In larger businesses, make sure hazardous waste generating departments are billed for management, compliance, and disposal costs incurred by their activities. Hazardous waste management costs covered under a general expense fund do not give specific departments an incentive to minimize their wastes.
- Be innovative in trying new procedures and products.
- Find ways to use paper. Make notepads, poster-paper, or other products from extra paper. Recycle all paper, waste or donate it to schools and churches. Recycle aluminum plates, negatives, and any other silver-laden paper.

Image Processing

Silver compounds are classified as hazardous wastes under State and Federal law if liquid wastes exceed five milligrams per liter of silver at a pH of 5.0. If process baths are discharged into the sewer, a permit by the local sanitation department is usually required. Concentrations of silver-contaminated wastewater must be maintained below local limits established by each sewering agency.

Ways to Manage Silver

- Eliminate it by using silver-free films. Some silverless products are vesicular, diazo, and electrostatic films. Photopolymer films contain carbon black as a substitute for silver.
- Recover silver from fixing baths and have a commercial recycler pick it up. Purchase a silver recovery unit and perform the recycling of fixer on the premises.
- Add ammonium thiosulfate to silver-contaminated baths to extend the allowable buildup of silver.



Process Baths

- Use an acid stop bath prior to the fixing bath. This reduces the effect of an alkaline developer on the fixing bath pH. Add acetic acid to the fixing bath, keeping the pH low to maximize soluble complexes.
- Use floating lids on bleach and developer containers to keep them fresh.
- Install waterless paper and film developing units to minimize the volume of fixer waste. Segregate fixer from developer waste.
- Substitute nonhazardous raw materials for hazardous materials whenever possible.
- Install electronic imaging and/or laser platemaking. By editing on a video terminal, the need for photographing and reshooting can be reduced. This alternative is costly. Make sure the payback period is evaluated before purchase.
- Employ countercurrent rather than parallel rinse techniques. Countercurrent rinsing means water from previous rinsings is used in the initial film washing stage. Fresh water enters the process at the final rinse stage at which point much of the contamination is already rinsed off the film.
- Protect process baths that spoil easily by keeping them containerized. Small scale photodevelopers can containerize process baths and use glass marbles to bring the liquid level to the brim each time the liquid is used.
- Using personal computers with commercial publishing capabilities allow the user to set up and edit jobs before going to print. Materials, time, and waste are minimized from draft to final product.

Plate Processing

Replace metal etching processes with the associated hazardous chemical solutions and heavy metals wherever possible.

Alternative plates include:

- Presensitized lithographic - some solutions resulting from these plates can be discharged to the industrial sewer with written authorization or permit from the sanitation district. Water-based solutions are currently available and widely used. The plates can be sold to an aluminum recycler.
- Plastic or photopolymer - generally, these are processed with a water-based solution containing little or no hazardous waste.
- Flexographic
- Electrostatic - paper plates made directly from artwork are used on copier/duplicator presses and eliminate several process steps.

In addition, hot metal can be remelted or sold to a recycler.

PRINTING AND FINISHING

Inks

Many clients would use less hazardous products if given the choice, provided that product quality is not compromised. Inform clients of specific inks that are recyclable or are not hazardous and provide samples illustrating finished products. Encourage them to select these materials.

The composition of inks varies widely. Some inks contain chemicals that would be classified as hazardous but others do not. Inks frequently get their color from the metals or hazardous pigments they contain. Inks containing metals and/or those using a solvent carrier are often classified as hazardous. It is the responsibility of shop owners to determine whether the inks used in their operations are hazardous. For assistance in making the determination, review the container label, the MSDS, or ask your ink distributor. (You can also contact the DTSC's Waste Evaluation Unit at (916) 324-1807 for more information.)

Most inks can be recycled; they are often blended to make black ink. For smaller print shops, consider coordinating with larger plants or newspaper publishers that use a rubber-or oil-based ink to recycle your ink. These businesses usually recycle their inks onsite or ship them off-site in bulk shipments. Also, consider purchasing inks from a distributor who will take or buy back unused or spent inks.

Waste Minimization Alternatives for Inks

- Fill ink fountains only enough for a particular run or shift. Return all unemulsified inks to their containers. Install automatic ink levelers to keep ink fountains at their optimal level for good print quality in large web presses.
- Run similar jobs simultaneously to minimize waste generation between cleanup and start of the next run.
- Use water-based inks whenever possible to cut down on the use of solvent-based inks that cause employee and environmental hazards.

- Clean ink fountains only when changing colors or when the ink might dry out between runs to minimize waste ink generation. Fountains can be left with ink overnight if sprayed with special nondrying aerosol materials.
- Dedicate one press for inks with hazardous pigments or solvents.
- Save old inks and market as "house colors."
- Donate unemulsified inks to trade schools, colleges, etc.

Advantages of Water-Based Inks (flexographic and gravure processes)

- Often classified as non-hazardous
- No special air pollution control equipment required
- Less toxic to employees
- Reduced disposal cost

Advantages of Ultraviolet Inks

- Dries quickly when exposed to ultraviolet light
- Can remain in ink fountains for long periods without drying
- Eliminates "set off," thus eliminating the need for anti-offset sprays
- Eliminates ventilated storage of sheets during oxidative drying

Advantages of Electron Beam Drying (EB) (used on web presses)

- Similar in use to ultraviolet inks
- Uses less solvent than heat set inks

Isopropyl Alcohol

Use a fountain solution that contains low concentrations of isopropyl alcohol (IPA) or one containing no IPA. IPA emissions can cause air pollution problems and may require the installation of pollution control equipment. Substitutes are available. Operational adjustments may be required to make them work well but the alternative cost of air pollution control equipment installation can make the effort economically worthwhile.

Waste Solvents

Waste solvents are generated when cleaning presses. These wastes are considered hazardous and should be recycled. For a listing of recycling companies, check the telephone book under "Solvents" or contact the DTSC's Alternative Technology Division at (916) 324-1807 for a free copy of the *California Waste Exchange Directory*. Solvents may not be land disposed. Discharge of solvents to the industrial sewer is, in general, not allowed.

Rags contaminated with inks and/or solvents may be hazardous waste. For further clarification, contact the United States Environmental Protection Agency (US EPA), Region 9 at (415) 974-8076.

Solvent Alternatives

- Use soap or detergent solutions wherever possible. Use solvents only for cleaning inks and oils.
- Specially made blanket washes that do not contain hazardous materials are now available. These washes also meet emission requirements of the various air pollution control districts in California.
- Small solvent recovery systems are currently on the market and work well.
- Many acetic acid-based solvents are on the market that are less toxic than other solvents.

Waste Lubricating Oils

Lubricating oils should be managed as hazardous wastes when they have no further use. Call the California Waste Management Board's Waste Oil Hotline at 1-800-553-2962 for information on waste oil handling. For large quantities of oil, look in the Yellow Pages of the telephone book under "Oils–Waste" for a transporter registered with the State of California to haul hazardous wastes for recycling.

ADDITIONAL PUBLICATIONS

Disposal of Small Volumes of Photographic Processing Solutions, Eastman-Kodak Publication J-52, 343 State Street, Rochester, N.Y., 14650.

Waste Audit Study - Commercial Printing Industry, Department of Toxic Substances Control, May 1988.

Two US EPA publications which can be ordered from National Technical Information Services, U.S.

Department of Commerce, 5285 Port Royal Road, Room 208, Springfield, VA, 22161, (703) 487-4650, are:

Waste Minimization, Issues and Options - Volume II, Office of Solid Waste and Emergency Response, October 1986, EPA Report #530-SW-86-042, Order # PB87-114369.

Environmental Aspects of Chemical Use in Printing Operations, Conference Proceedings, Office of Toxic Substances, January, 1976, EPA Report #560-1-75-005, Order # PB-251406.

FURTHER INFORMATION

Additional waste minimization techniques, not included in this fact sheet, are currently being developed. Low cost loans are also available if your business meets certain requirements. If you would like more information or have any case studies to share, please contact the Technology Clearinghouse in the Alternative Technology Division at:

Department of Toxic Substances Control
Alternative Technology Division
400 P Street, 4th Floor / P.O. Box 806
Sacramento, CA 95812-0806
(916) 324-1807

To get an EPA ID number, call:

Department of Toxic Substances Control
Program and Administrative Support Division
(916) 255-1136

For information about your regulatory requirements, contact the DTSC regional office nearest you:

Region 1	Sacramento Fresno	(916) 855-7700 (209) 297-3901
Region 2	Berkeley	(415) 540-2122
Region 3	Burbank	(818) 567-3000
Region 4	Long Beach	(213) 590-4868

In addition, print shop owners and operators may be able to obtain information from:

- registered hazardous waste haulers
- the Printing Industries Association of Northern and Southern California
- recycling/treatment equipment vendors
- informational workshops

STATE OF CALIFORNIA

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